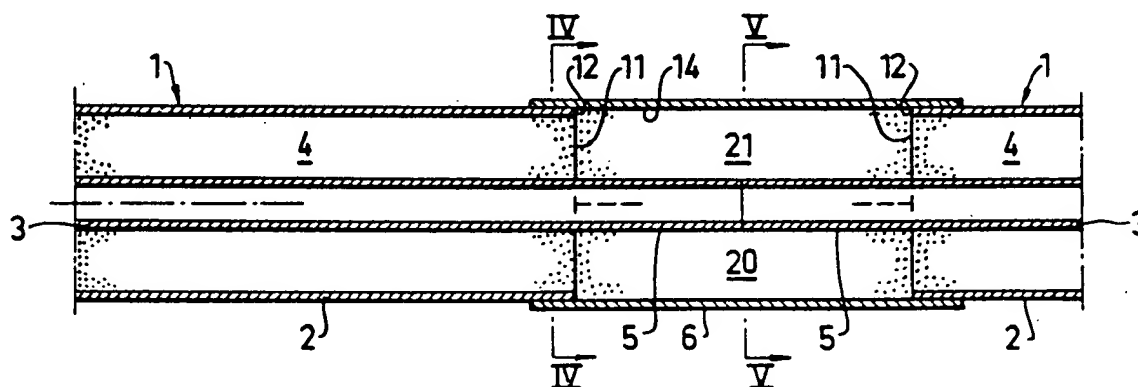




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(54) Title: METHOD AND DEVICE AT JOINING OF INSULATED PIPES**(57) Abstract**

Method at joining of insulated pipes (1), which comprise an outer casing (2), and inner pipe (3) and a heat insulating material (4) placed between the outer casing (2) and the inner pipe (3). The end section (5) of the inner pipe projects a certain length in the end regions of the pipes (1) intended for the joining outside the end surface (11) of the heat insulating material and the end surface (12) of the outer casing. On one of the two pipes (1) to be joined a tubular mantle (6) surrounding the outer casing (2) has been applied, the length of said mantle being greater than the total projecting length of the inner pipes (3). In this phase the mantle (6) is moved along one pipe (1) so that the joining area is entirely uncovered. The projecting inner pipes (3) are then connected with each other. The next step is that the inner pipes (3) now joined are heated to working temperature after which two pipe sectors (20, 21) are placed in the joining area after applying an adhesive expanding at curing. The pipe sectors (20, 21) are preferably prefabricated and made of a heat insulating material. The best joining result is obtained if all the outer surfaces of the pipe sectors (20, 21) make contact with said adhesive. Moreover, adhesive is applied to the outer surfaces of the outer casings (2) in a region adjacent their end surfaces (12), after which the tubular mantle (6) is moved along the pipe (1) so that the mantle will enclose the pipe sectors (20, 21) and make contact with the outer casing (2) on both sides of said pipe sectors. The invention also relates to the device at the joining of said insulated pipes.

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Method and device at joining of insulated pipes

This invention relates to a method at joining of insulated pipes, which comprise an outer casing, an inner pipe and a heat insulating material located between the outer casing and the inner pipe, the end section of the inner pipe projecting a certain length outside the end surface of the heat insulating material and the outer casing in the end regions of the pipes intended for joining, a tubular mantle surrounding the outer casing being applied to one of two pipes intended for joining, the length of said mantle being greater than the total projecting length of the inner pipes, after which the ends of the projecting inner pipes are interconnected. The invention also relates to a device at joining of said insulated pipes.

At joining of insulated pipes of the kind indicated above the tubular mantle surrounding the outer casing has so far been moved along the outer casing after connection of the ends of the projecting inner pipes so that the mantle makes contact with the outer casing of both the pipes now interconnected. After this a hole has been made in the mantle in order to fill through this a heat insulating material in the form of a foam so that the entire cavity existing between the inner pipes and the mantle is filled up with this foam. However, it has been found that this method, when used under conditions existing in the field does not provide a desired quality of the heat insulation at the place of the joint. The main reasons for this are that the filled foam often becomes inhomogeneous and that water outside the outer casing due to the deficient sealing obtained between the mantle and the outer casing may leak into the filled foam and then deteriorate the heat insulating properties thereof.

It is the object of this invention to provide a method and a device not being beset with said shortcomings, and this object is achieved by the method and the device having the characteristic features defined

in the claims.

Among the advantages of the invention it can be mentioned that the heat insulation at the place of the joint becomes more efficient than what is the case at use of the previously known technology mentioned above. This is realized in that prefabricated pipe sectors in the form of e.g. pipe halves can be used according to the invention which, thus can be prefabricated under factory conditions, whereby it is easier to achieve a desired quality level. If the pipe sectors, further, are glued onto the inner pipes and their other surroundings, it is ensured that the heat insulating material follows the changes in length arising due to temperature changes of the inner pipes. In known technology air gaps mostly arise at such changes in length. According to the invention the pipe sectors are applied to inner pipes heated to normal working temperature, and this has the effect that the linear measures of the prefabricated pipe sectors are adapted to this length, which in turn results in that the stresses in the glue lines will not be so great at additional rise of temperature as might otherwise be the case.

Illustrative examples of the invention will be more closely described in the following with reference to the enclosed drawings in which Fig. 1 shows a longitudinal section of two insulated pipes being in contact with each other, the inner pipes of which are to be connected to each other, after which the place of the joint is to be insulated, Fig. 2 shows a section taken along the line II-II in Fig. 1, i.e. a cross section of the insulated pipe, Fig. 3 shows a longitudinal section of two pipes joined to each other where the place of joint is insulated in accordance with the invention, Fig. 4 shows a section taken along the line IV-IV in Fig. 3, and Fig. 5 shows a section taken along the line V-V in Fig. 3.

As is evident from Fig. 1 and Fig. 2 the insulated pipe 1 comprises an outer casing 2, an inner pipe 3 and a heat insulating material 4 placed between the

outer casing 2 and the inner pipe 3. The end section 5 of the inner pipe 3 projects in the end regions of the pipes 1 intended for joining a certain length outside the end surface of the heat insulating material 4 and the casing 2. On one of two of the pipes 1 intended for joining a tubular mantle 6 surrounding the outer casing 2 has been applied, the length of which is greater than the total projecting length of the inner pipes 3.

10 The joining operation is carried out in such a way that the projecting inner pipes 3 are first connected with each other. This can e.g. be done by welding, but of course a lot of other joining methods can be utilized. A joining sleeve of some kind can for
15 instance be used. When the joining of the inner pipes 3 is carried out these are heated to the normal working temperature to be used, and this can e.g. be done by circulating a liquid of the intended temperature in the inner pipes 3. After this an adhesive is applied
20 to the exposed outer surface 10 of the inner pipes 3, to the end surfaces 11 of the heat insulating material 4, to the end surfaces 12 of the outer casing 2 and to a certain extension along the outer surface 13 of the outer casings 2, which extension should be so long
25 that the end regions of the mantle 6 will be completely glued when the mantle has entered its final position later. The adhesive is preferably of a type which expands at curing.

Thereafter two prefabricated pipe sectors 20
30 and 21 are produced, the total cross section of which corresponds to the surface located between the outer surface 10 of the inner pipe 3 and the inner surface 14 of the mantle 6. The length of the pipe sectors 20 and 21 corresponds to the distance between the end
35 surfaces 11 of the heat insulating material 4 facing each other when the inner pipes 3 are at working temperature. The adhesive mentioned above is applied to the contact surfaces 22 and 23 of the pipe sectors 20 and 21 and to the mantle surfaces 24 of the pipe sectors. After this the pipe sectors 20 and 21 are placed
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in the position shown in Fig. 3 and Fig. 5. It may be suitable in order to get a reasonable curing time of the adhesive that an accelerator is added in connection with the application of the pipe sectors 20 and 21 which speeds up said curing. When the pipe sectors 20 and 21 are positioned the mantle 6 is moved along the outer casing 2 until it has entered the position shown in Fig. 3, i.e. a position where it encloses the pipe sectors 20 and 21 and where its end regions make contact with the outer casing 2 of the joined pipes 1 located on both sides of the pipe sectors 20 and 21. When the adhesive has then hardened the joint is ready in its entirety. As the adhesive expands at its curing it will fill up the joints arising due to the fact that the measure adaptation of the pipe sectors 20 and 21 cannot become quite perfect for natural reasons.

It should be mentioned that the working sequence at the application of the adhesive of course can be varied within the scope of the invention in a plurality of various manners. How many surfaces are to be coated by adhesive and how much adhesive is to be applied is more a question of quality. Of course it is also possible to omit glueing completely and only to arrange a seal between the outer casing 2 and the tubular mantle 6. However, at such a joint the heat losses will be substantially greater than if an adhesive expanding at curing is applied.

As an example of the current materials which can be used with insulated pipes the following can be mentioned. The outer casing 2 is usually made of polyethylene, the inner pipe 3 of steel and the heat insulating material 4 of polyurethane foam. It is then of course also suitable to make the pipe sectors 20 and 21 of polyurethane foam and the tubular mantle 6 of polyethylene. Moreover, it is then also suitable to use a one-component polyurethane adhesive of a type curing by means of moisture. The adhesive should fill the joint and be suitable to use also where a bad joint adaptation is present and where both sealing and adhesive properties are suitable. In order to get

a reasonable curing time current surfaces can be moistened by water.

As to the pipe sectors 20 and 21 these can mostly be prefabricated for a certain type of pipe as the projecting length of the inner pipe 3 is mostly constant. Of course pipe sectors 20 and 21 of a definite cross section can be prefabricated but of a greater length than what is normally used. The desired lengths can then be cut at the place of use as desired. In the illustrative example shown two pipe sectors have been used, but a greater number of pipe sectors can of course be selected within the scope of the invention if this is found suitable. possible

It should also be mentioned that if the greatest safety margin against in-leakage of water between the outer casing 2 and the tubular mantle 6 is desired it is of course possible to arrange an extra outer sealing at the transition region between these.

The invention is thus not restricted to what has been shown and described but amendments and modifications thereof are possible within the scope of the following claims.

Patent Claims

1. A method at joining of insulated pipes (1) which comprise an outer casing (2), an inner pipe (3) and a heat insulating material (4) located between the outer casing and the inner pipe, the end section (5) of the inner pipe projecting in the end regions of the pipes (1) intended for joining a certain length outside the end surface (11, 12) of the heat insulating material and the outer casing, a tubular mantle (6) being applied to one of two pipes (1) intended for joining, said mantle surrounding the outer casing (2), the length of said mantle being greater than the total projecting length of the inner pipes (3), after which the ends of the projecting inner pipes (3) are connected with each other, c h a r a c t e r i z e d i n that two or more pipe sectors (20, 21) are placed against the projecting inner pipes now joined, said tubular sectors (20, 21) being manufactured from a heat insulating material, and that the mantle (6) is then moved along the outer casing so that it encloses said pipe sectors (20, 21).
2. The method of claim 1, c h a r a c t e r i z e d i n that an adhesive is applied to the joined inner pipes (3) before placing the pipe sectors (20, 21) against the joined inner pipes so that an adhesive joint is obtained between the pipe sectors (20, 21) and surfaces adjacent these.
3. The method of claim 1 or 2, c h a r a c t e r i z e d i n that an adhesive is applied before pushing the mantle (6) along the outer casing (2) so that an adhesive joint is obtained in contact regions between the outer casing (2) and the mantle (6) which contact regions are located on both sides of the pipe sectors (20, 21).
4. The method of any one of claims 1-3, c h a r a c t e r i z e d i n that a working temperature of the joined inner pipes (3) has been created before adaptation of the pipe sectors (20, 21) against the joined inner pipes (3).

5. A device at joining of insulated pipes (1), which comprise an outer casing (2), an inner pipe (3) and a heat insulating material (4) located between the outer casing and the inner pipe, the end section (5) of the inner pipe projecting in the end regions intended for joining a certain length outside the end surface (11, 12) of the heat insulating material and the casing, characterized in that the device comprises two or more pipe sectors (20, 21) manufactured from a heat insulating material and that the total volume of the pipe sectors substantially fill up an area limited by the projecting inner pipes (3), the end surfaces (11, 12) of the heat insulating material and the outer casings facing each other and an inside diameter of a mantle (6) surrounding said pipe sectors (20, 21).

6. The device of claim 5, characterized in that the pipe sectors (20, 21) are connected reciprocally and with adjacent portions by means of an adhesive.

7. The device of claim 5 or 6, characterized in that the mantle (6) and the outer casing (2) are connected with each other on both sides of the pipe sectors (20, 21) by means of an adhesive.

8. The device of claim 6 or 7, characterized in that the adhesive is one expanding at curing.

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FIG.1

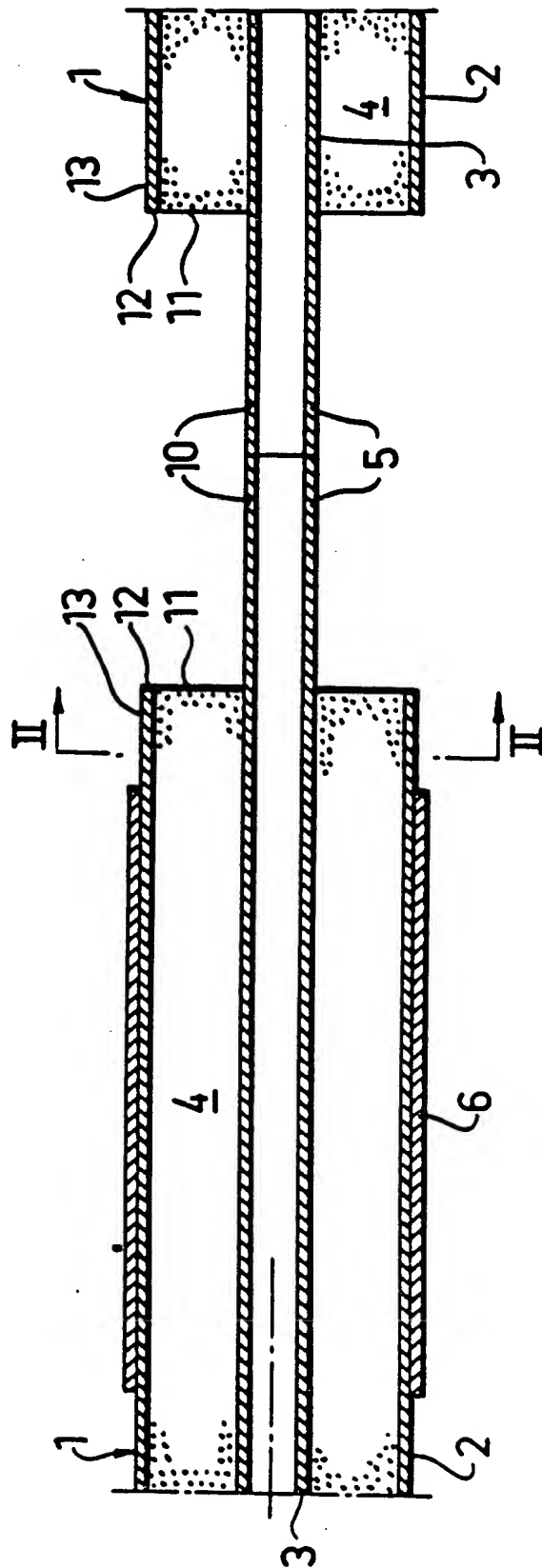


FIG.2

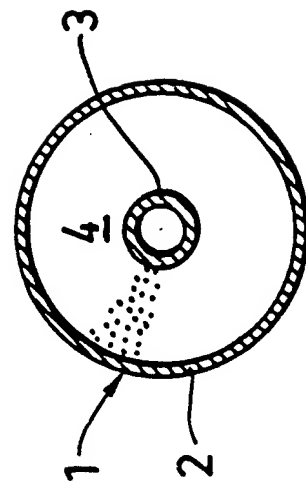


FIG.3

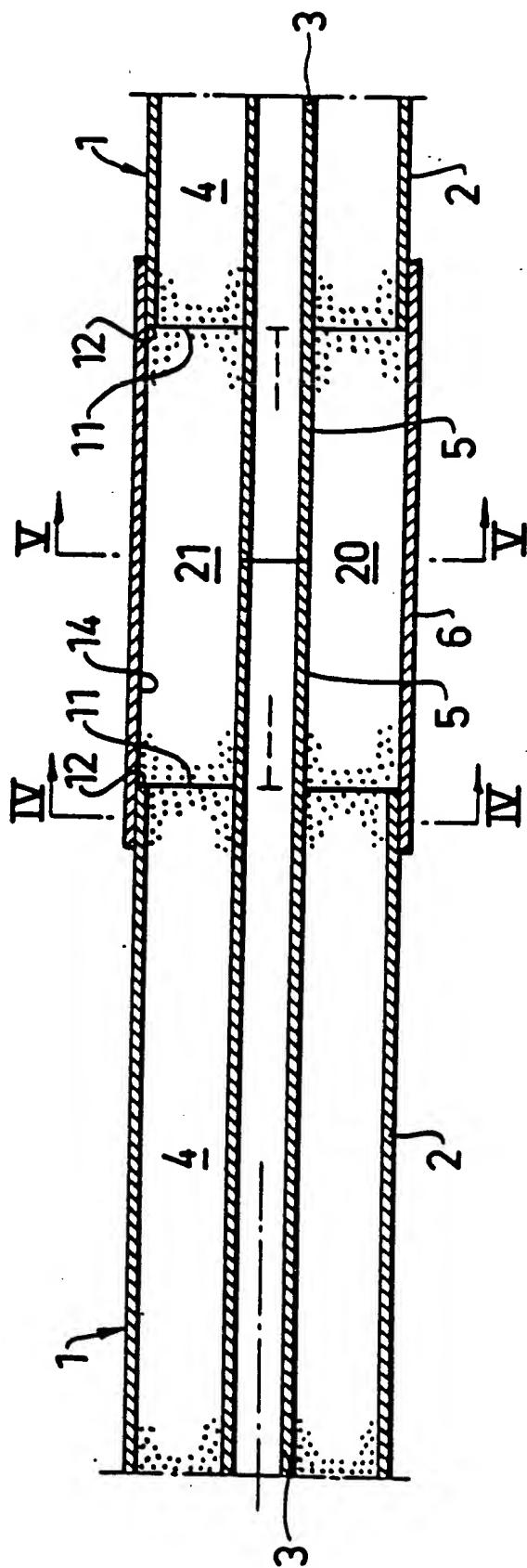


FIG.4

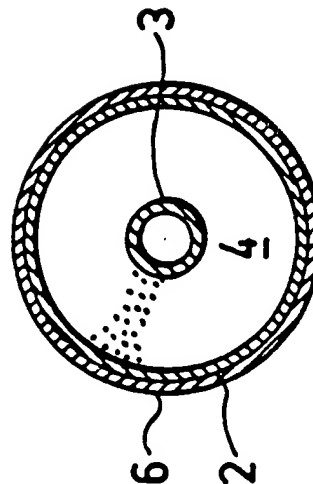
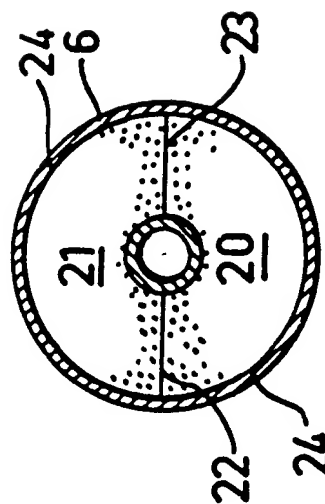
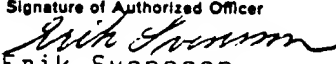


FIG.5



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE85/00177

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC 4		
F 16 L 59/14		
II. FIELDS SEARCHED		
Minimum Documentation Searched 7		
Classification System	Classification Symbols	
IPC 3 US C1	F 16 L 59/00, 14, 16 138:103, 111, 114, 145-149	
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SE, NO, DK, FI classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT 9		
Category *	Citation of Document, 11 with indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13
X	SE, B, 7710447-9 (AB GUSTAVSBERG) 25 September 1978, See fig. 2, det. 16, 19 and 20.	1, 5
A	SE, C, 7800521-2 (AB GUSTAVSBERG) 22 October 1979, See the claim.	2-4, 6-7
A	DE, A1, 2 640 544 (P. TRIEB) 16 March 1978, See fig. 2, det. 16a and 16b.	6
A	EP, A1, 0 075 901 (VON ROLL AG) 6 April 1983, See claim 1.	3
X	EP, A1, 0 079 702 (N V RAYCHEM S.A.) 25 May 1983, See claim 1. & GB, 2108625 JP, 58101013	1, 3, 5-7
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